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Santa Clara, CA 95054

Installation and Reference for the BayStack 60-12T/60-24T 10/100 Ethernet Hubs

NORTTEL
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Congratulations on your purchase of a BayStack™ 60-12T/60-24T 10/100 Ethernet Hub. The BayStack 60-12T/60-24T 10/100 Ethernet Hubs enable you to migrate easily from Ethernet to Fast Ethernet. You can migrate to Fast Ethernet while maintaining much of your existing Ethernet network and equipment.

In this guide, the BayStack 60-12T and BayStack 60-24T 10/100 Ethernet Hub are referred to collectively as the BayStack 60-12T/60-24T 10/100 Ethernet Hub, or just as the “hubs.” Each model is referred to specifically when features and functions are unique to that particular model.

Before You Begin

This guide is intended for users with the following background:

- Familiarity with network hardware and cable requirements
- Experience in installing rack-mounted network hardware
- Working knowledge of Ethernet (10 Mb/s, or 10BASE-T) and Fast Ethernet (100 Mb/s, or 100BASE-T) operations

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Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5402-7041

Chapter 1

Introduction

The BayStack 60-12T/60-24T 10/100 Ethernet Hubs provide 12 or 24 RJ-45 ports for 10 Mb/s or 100 Mb/s Ethernet/Fast Ethernet connections. Ten or 100 Mb/s traffic is determined by the autosensing capability of the RJ-45 ports in the BayStack 60-12T/60-24T 10/100 Ethernet Hubs.

Design features of the BayStack 60-12T/60-24T 10/100 Ethernet Hubs provide a user friendly interface, simplifying installation and network troubleshooting.

Product Features

The BayStack 60-12T/60-24T 10/100 Ethernet Hub provides the following features:

- 12/24 autosensing 10/100 Mb/s Ethernet ports with internal switching/bridging hardware
- One MDI/MDI-X port, selected by a push button
- Support for IEEE 802.3 10BASE-T and IEEE 802.3u 100BASE-TX standards
- Transparent bridging between 10 Mb/s and 100 Mb/s segments through an internal switch module
- Support for autopartitioning and reconnection features to facilitate faulty segment isolation
- Polarity autodetection and autocorrection for 10 Mb/s segment UTP/STP ports
- Automatic jabber handling functions
- Extensive front panel LEDs provide all information at a glance
- Plug-and-play connection

- Up to 2 units can be daisy-chained (Class II Repeater)
- Separates network traffic into two network collision domains (10Mb/s, 100Mb/s)
- Store-and-forward packet transmission methods

Product Description

Package contents of the BayStack 60-12T/60-24T 10/100 Ethernet Hub include materials for rack mounting and connecting the hubs, such as a rack mount kit and an AC power cord. Standard Ethernet UTP or STP cables are not provided.

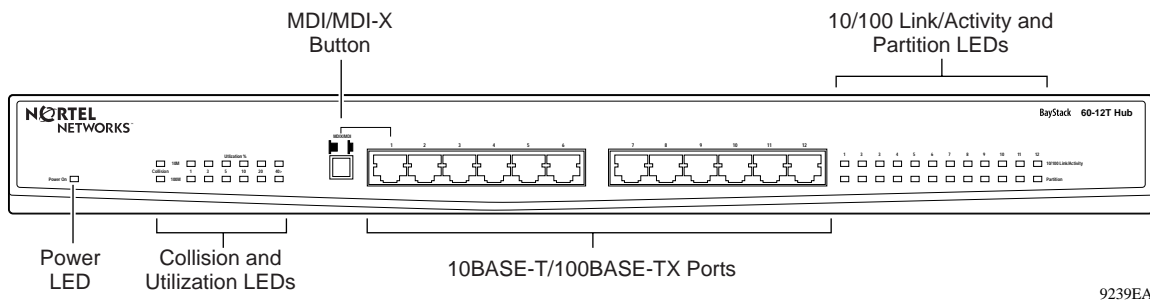
Autosense Capability

BayStack 60-12T/60-24T 10/100 Ethernet Hub ports automatically sense the 10 Mb/s or 100 Mb/s transmission speed of attached devices. Each port automatically sends traffic through the route with the highest available transmission speed, depending on the capability of the connected device. Traffic is forwarded to the 10 or 100 Mb/s segment on the hub, again depending on the incoming speed of the traffic. By confining traffic to its respective segments and only forwarding traffic to the other segment when required, the overall load on the network is significantly reduced.

Front Panel

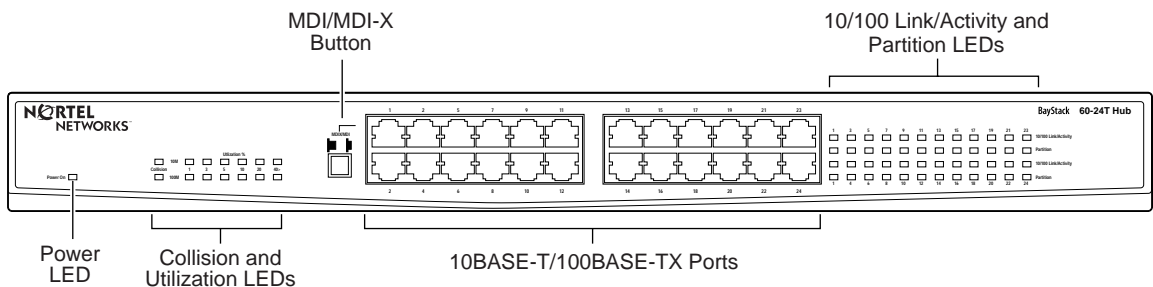
The BayStack 60-12T/60-24T 10/100 Ethernet Hub includes front panel LEDs and ports for connecting to other devices.

[Figure 1-1](#) and [Figure 1-2](#) show the front panels of the BayStack 60-12T 10/100 Ethernet Hub and BayStack 60-24T 10/100 Ethernet Hub, respectively. [Table 1-1](#) on [page 4](#) provides further details about the LEDs.



9239EA

Figure 1-1. BayStack 60-12T Front Panel



9246EA

Figure 1-2. BayStack 60-24T Front Panel

LEDs

This section describes the LEDs on the front panel of the BayStack 60-12T/60-24T 10/100 Ethernet Hub. [Table 1-1](#) describes the LEDs.

Table 1-1. LED Descriptions

LED	Color	Activity	Indication
Power	Green	On	Power is supplied to the hub.
Utilization % 10 Mb/s	Green	On	Data transmission is occurring on a 10 Mb/s network segment at the indicated rate.
	Green	On	Data transmission is occurring on a 100 Mb/s network segment at the indicated rate.
Collision 10 Mb/s	Yellow	On	Data collision is occurring on a 10 Mb/s network segment.
	Yellow	On	Data collision is occurring on a 100 Mb/s network segment.
10/100 Link/Activity	Yellow	On	The port is connected to a 10 Mb/s segment.
		Blinking	Data is being received to a 10 Mb/s segment.
	Green	On	The port is connected to a 100 Mb/s segment.
		Blinking	Data is being received to a 100 Mb/s segment.
Partition	Yellow	On	Partitioning has occurred at a port.
			The Link/Activity LEDs display whether a 10 Mb/s port (yellow) or a 100 Mb/s port (green) is partitioned when the yellow partition LED is lit for a specific port.

Port Functions

This section describes port partitioning and MDI/MDI-X modes. Partitioning is an automatic function of BayStack 60-12T/60-24T 10/100 Ethernet Hub ports. Certain ports can be configured to MDI/MDI-X mode with the MDI/MDI-X button.

Port Partitioning

A port is automatically disabled by the hub when a serious error occurs, such as continuous collisions on a single packet. This process is known as autopartitioning. A partitioned port indicates an overloaded network or a malfunctioning device on the network. When the port receives a valid packet from the connected device, or is able to transmit a packet from the port, it automatically releases the port so that it becomes active again.

- Partitioning occurs at a 100 Mb/s port when there are 61 consecutive collisions.
- Partitioning occurs at a 10 Mb/s port when there are 32 consecutive collisions, or when one collision lasting as long as 575.2us has occurred.

MDI/MDI-X Modes

Adapter cards in computers and workstations usually contain media-dependent interface (MDI) ports, also called uplink ports. Most hub ports are configured as media-dependent interfaces with built-in crossover ports, called MDI-X or normal ports. By default, all BayStack 60-12T/60-24T 10/100 Ethernet Hub ports are set to MDI-X, or normal, mode. You can connect your hub to computers and workstations in MDI-X mode using a standard straight-through cable.

You need a crossover cable to connect your hub to other hubs, switches and routers if you are using a hub port in normal, MDI-X, mode. You can use a straight-through cable to connect to these devices if you configure a port on your hub to the uplink mode.

You can configure port 1 on the BayStack 60-12T/60-24T 10/100 Ethernet Hub from normal to uplink mode with the MDI/MDI-X button.

Refer to [“Cable Types and MDI/MDI-X Modes”](#) on [page 3-3](#) for details regarding which cable or mode to use for specific devices.

MDI/MDI-X Button

The MDI/MDI-X button sets port 1 on the BayStack 60-12T/60-24T 10/100 Ethernet Hub from a normal (MDI-X) port to an uplink (MDI) port. Set the MDI/MDI-X button to uplink (MDI) mode to connect your BayStack 60-12T/60-24T 10/100 Ethernet Hub to another Ethernet hub or switch using a standard straight-through Ethernet cable.

Refer to [“Cable Types and MDI/MDI-X Modes”](#) on [page 3-3](#) for details regarding using straight-through or crossover cables to connect your BayStack 60-12T/60-24T 10/100 Ethernet Hub to various network devices.

Rear Panel

The rear panel ([Figure 1-3](#)) of the BayStack 60-12T/60-24T 10/100 Ethernet Hub includes a standard AC power cord receptacle.



9259EA

Figure 1-3. BayStack 60-12T/60-24T Rear Panel

Hardware and Environmental Requirements

The following environmental and hardware specifications are required for proper installation and function of your hub:

- Power - 100 to 240 V AC (+/- 10 %), 50 to 60 Hz (+/- 3 Hz)
- The hub should be located in a cool, dry place, with at least 10 cm (4 inches) of space in front and behind the hub for ventilation.
- Do not place the hub in direct sunlight. Keep the hub away from heat sources or areas with high amounts of electromagnetic interference.
- If you intend to mount the hub in a rack, make sure you have adequate mounting screws, brackets, bolts, nuts, and appropriate tools.
- Be sure you have all necessary network cables and connectors.

Chapter 2 Typical Applications

The BayStack 60-12T/60-24T 10/100 Ethernet Hubs provide flexibility in configuring your network. You can use the hubs in a standalone configuration, or in multiple hub configurations to utilize your existing Ethernet and Fast Ethernet equipment. You can stack the hubs on top of each other on a flat surface, or mount them in standard 19" equipment racks. In addition to attaching your hub to workstations or printers, you can extend your current local area network (LAN) by connecting a BayStack 60-12T/60-24T 10/100 Ethernet Hub to a collapsed backbone device such as a switch or a router.

This chapter discusses various environments where you can use the BayStack 60-12T/60-24T 10/100 Ethernet Hub, such as environments which have a mixed network of 10 Mb/s and 100 Mb/s devices.

Mixed 10 Mb/s and 100 Mb/s Environment

The BayStack 60-12T/60-24T 10/100 Ethernet Hub runs at both 10 Mb/s and 100 Mb/s simultaneously. Devices running at 10 Mb/s and devices running at 100 Mb/s are located on separate network segments within one BayStack 60-12T/60-24T 10/100 Ethernet Hub. These two segments communicate with the internal switching hardware, which is built in to the hub.

Basic Mixed Network

[Figure 2-1](#) shows a basic use of the BayStack 60-12T/60-24T 10/100 Ethernet Hub in a simple mixed environment network. The hub connects various workstations to each other. Workstations can be operating at 10 Mb/s and/or 100 Mb/s.

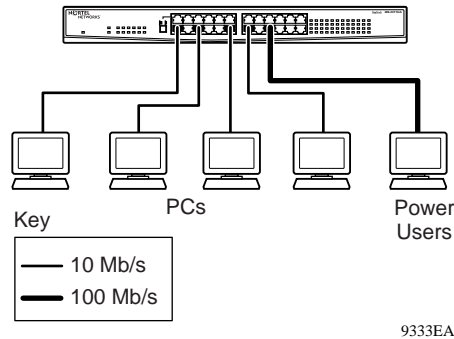


Figure 2-1. Example of a Basic Mixed Network

The example shows a BayStack 60-24T 10/100 Ethernet Hub. However, you can use a BayStack 60-12T 10/100 Ethernet Hub instead, depending on the number of devices you need to connect.

Expanded Mixed Network

[Figure 2-2](#) shows an expanded mixed network using two BayStack 60-24T 10/100 Ethernet Hubs connected to each other and to several devices. The devices use 10 Mb/s and 100 Mb/s speeds.

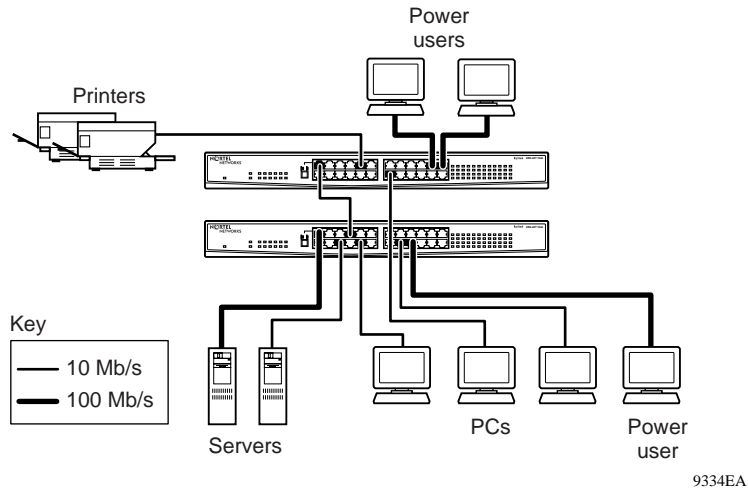


Figure 2-2. Example of an Expanded Mixed Network

The example shows two BayStack 60-24T 10/100 Ethernet Hubs. However, you can use two BayStack 60-12T 10/100 Ethernet Hubs instead, or one 12-port hub and one 24-port hub, depending on the number of devices you need to connect.

[Figure 2-3](#) shows the specific ports used to connect two hubs, as in the expanded network in [Figure 2-2](#). Port 1 on the top hub is set to MDI (uplink) with the MDI/MDI-X button. A UTP/STP Ethernet cable connects port 1 of the top hub to another non-MDI port on the second hub. This type of connection is known as “daisy-chaining.”

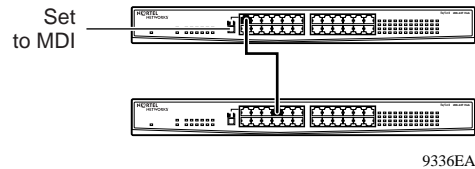


Figure 2-3. Daisy-Chained Hubs

Bridging

The internal switching hardware of the hub bridges the two collision domains, the 10 Mb/s and 100 Mb/s segments. The switching hardware handles the bridging, which allows 10 Mb/s and 100 Mb/s segments to talk to each other.

Chapter 3

Installation

You can stack the BayStack 60-12T/60-24T 10/100 Ethernet Hubs on a flat surface, or mount them in a standard 19” equipment rack. This chapter explains how to mount or stack your hubs, how to connect and power up the hub, and how to troubleshoot hub operations. Before installing the hub, be sure your environment meets the requirements defined in [“Hardware and Environmental Requirements”](#) on [page 1-6](#).

Package Contents

The contents of your product package should contain the following items:

- One of the following BayStack 60 Series Hubs:
 - BayStack 60-12T 10/100 Ethernet Hub (12 port 10/100 Mb/s hub)
 - BayStack 60-24T 10/100 Ethernet Hub (24 port 10/100 Mb/s hub)
- One mounting kit, including brackets and screws, for mounting the hub in a standard 19” equipment rack
- Appropriate power cord

Installing the Hub

You can stack hubs on a flat surface or you can mount the hubs in a standard 19" equipment rack.

Mounting the Hub in a Standard 19" Equipment Rack

You can mount BayStack 60-12T/60-24T 10/100 Ethernet Hubs in a rack, such as in a wiring closet or network center.

[Figure 3-1](#) shows three hubs mounted in a standard rack.

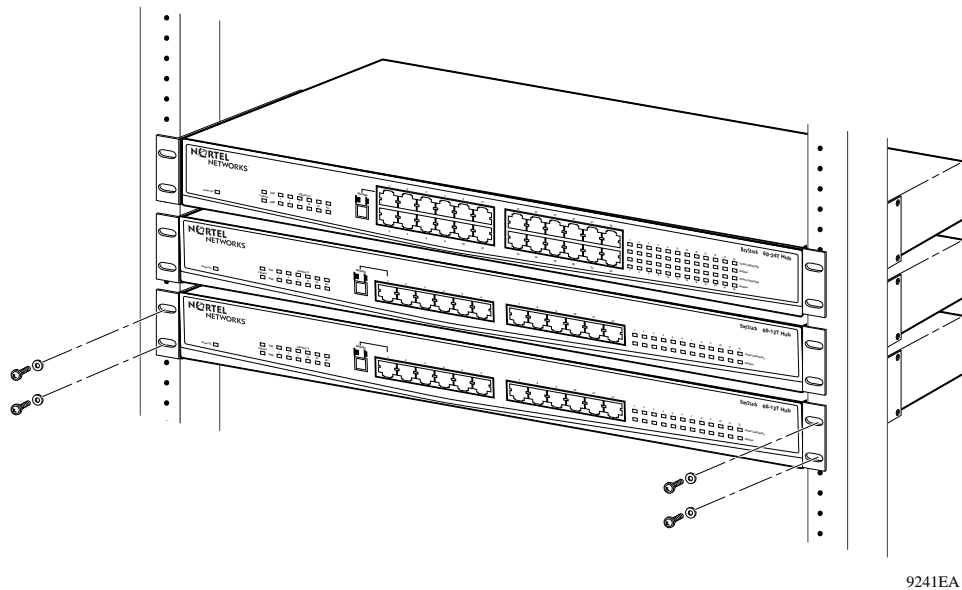


Figure 3-1. Rack Mounted Hubs

To mount hubs in a standard EIA 19" equipment rack:

- 1. Gather the brackets and screws included in the package that shipped with your hub.**
- 2. Attach one bracket to each of the front sides of the hub using a cross-head screwdriver.**
- 3. Align the front bracket holes with corresponding holes in the rack.**

4. **Insert the screws into the front of the bracket, through the rack, so that the screws extend past the rack.**
5. **Tighten the screws.**

Connecting the Hub To Other Devices

You can connect hubs to other network devices through the dual-speed MDI/MDI-X RJ-45 port on the front of the hub.

Cable Types and MDI/MDI-X Modes

You can use standard straight through Ethernet cables to connect your hub to PCs, printers, or servers. If you want to connect your BayStack 60-12T/60-24T 10/100 Ethernet Hub to routers, switches, and other hubs you must use a crossover cable unless you set the MDI/MDI-X button to uplink. You can only configure port 1 with the MDI/MDI-X button.

[Table 3-1](#) and [Table 3-2](#) show which cable types and MDI/MDI-X modes to use for various devices when connecting from the BayStack 60-12T 10/100 Ethernet Hub or BayStack 60-24T 10/100 Ethernet Hub, respectively.

Table 3-1. Cables and MDI/MDI-X Modes for the BayStack 60-12T 10/100 Ethernet Hub

Hub Port	Connecting Device	Mode	Cable Type
1 through 12	PC, server	MDI-X (normal)	Straight-through
1 through 12	Hub, router, switch	MDI-X (normal)	Crossover
1	Hub, router, switch	MDI (uplink)	Straight-through

Table 3-2. Cables and MDI/MDI-X Modes for the BayStack 60-24T 10/100 Ethernet Hub

Hub Port	Connecting Device	Mode	Cable Type
1 through 24	PC, server	MDI-X (normal)	Straight-through
1 through 24	Hub, router, switch	MDI-X (normal)	Crossover
1	Hub, router, switch	MDI (uplink)	Straight-through

Connecting the Hub Through a RJ-45 Port

You can connect a BayStack 60-12T/60-24T 10/100 Ethernet Hub to any device that has a standard RJ-45 network interface port. To connect simple devices such as workstations or servers, or more complex devices such as bridges or routers to the hub, use a standard RJ-45 port.

To connect the hub to another device through a RJ-45 Port:

- 1. Make sure the devices you want to connect to contain 10BASE-T or 100BASE-T network interface cards.**
- 2. Obtain one straight through shielded or unshielded twisted pair cable (STP or UTP) with RJ-45 connectors at each end for each device.**
 - Use 100 Ohm Category 3, 4, or 5 cable for 10 Mb/s Ethernet connections.
 - Use 100 Ohm Category 5 cable for 100 Mb/s Ethernet connections. Category 5 cable is recommended for all connections to avoid confusion between cables, and to provide for easy future migration of all devices to Fast Ethernet.
 - Each cable must be 100 meters long or less.
- 3. Connect one RJ-45 connector of the cable to the network interface card of your device.**
- 4. Connect the other RJ-45 connector of the cable to any available MDI-X, or normal, port on the hub.**

By default, all ports on the BayStack 60-12T/60-24T 10/100 Ethernet Hub except port 1 are MDI-X. The RJ-45 ports support both 10 Mb/s and 100 Mb/s Ethernet connections.

- 5. Be sure the tab on each RJ-45 connector clicks securely into position.**



Warning: Do not connect a phone jack connector to a RJ-45 port. You may damage the hub. Use only twisted pair Ethernet cables with RJ-45 connectors that comply with FCC standards.

Connecting the Hub Through the MDI Port

You can connect BayStack 60-12T/60-24T 10/100 Ethernet Hubs to other compatible hubs or switches through port 1 on the front panel of the hub, setting the MDI/MDI-X button to uplink.

To connect to another device through the MDI port:

1. **Insert an RJ-45 connector of a straight-through twisted pair Ethernet cable into port 1 of your hub.**

You can configure port 1 to uplink or normal mode using the MDI/MDI-X button.

2. **Set the MDI/MDI-X button next to port 1 to MDI, or uplink.**
3. **Insert the other RJ-45 connector in to any MDI-X port on another device.**

You can also connect this RJ-45 connector to a MDI port on another device set up as a daisy-chain configuration.

Applying Power to the Hub

To apply power to your hubs:

1. **Plug the power cord into the power socket in the rear of the hub.**
2. **Plug the other end of the power cord into a standard power outlet.**

The hub will automatically select the setting that matches the connected input voltage. No additional adjustments are necessary when you connect the hub to any input voltage, as long as the voltage range is within the range marked on the rear panel.

3. **Check the Power LED on the front panel.**

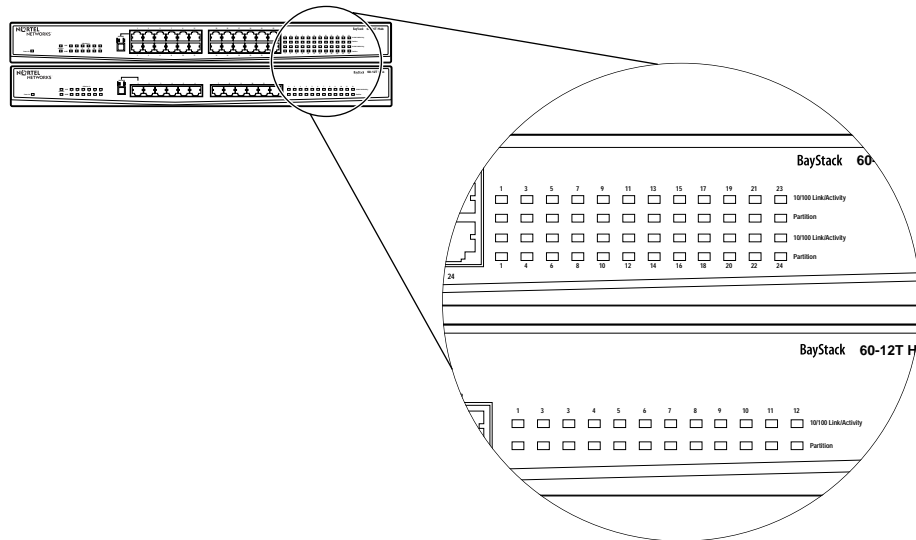
The Power LED should be on. The hub will perform a self-diagnostic test during the power on process.



Note: The hub supports a “hot remove” feature which permits you to connect or disconnect cables without powering off the hub. Operation of devices attached to the hub is not disrupted.

Verifying Port Status

You can check the status of each cable connection by viewing the port status indicators shown in [Figure 3-2](#) and described in [Table 3-3](#).



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Figure 3-2. Port Status LEDs

[Table 3-3](#) describes the light and color indications of port status LEDs.

Table 3-3. Port Status LED Descriptions

LED	State	Indication
Power	On (green)	The hub is receiving power.
Collision	Flashing (yellow)	A packet collision occurred in the 10/100 Mb/s domain.
Activity	Flashing (green)	The port is receiving 10/100 Mb/s traffic.
Partition	On (yellow)	The port has been partitioned from the network.
Link 10/100M	On (green)	The port has established a valid 100 Mb/s network connection.
	On (yellow)	The port has established a valid 10 Mb/s network connection.

Chapter 4

Troubleshooting

This chapter provides common testing methods, possible reasons for problems, and possible steps to take to solve the problems.

Verifying System Operations

You can verify that all attached devices have valid connections. The hub monitors the link status for each port. If a device is properly connected to the hub and if the device is transmitting a link signal, the Link indicator will light up for the corresponding port.

Follow these steps if the Link indicator fails to light when you connect a device to the hub:

- 1. Verify that the twisted-pair cable is properly attached to the connected device and the hub.**
- 2. Verify that the media connector, or RJ-45 connector, snaps securely into place when attached.**
- 3. Verify that your cable is functioning properly. Try attaching the cable to another port on another attached device that appears to be functioning properly.**
- 4. Check the length of each twisted-pair cable.**
 - Each cable should be no longer than 100 meters, or 328 feet, long.
 - If you are using two cascaded Fast Ethernet hubs be sure the cable between the two hubs is no longer than 5 meters, or 16 feet, long.
- 5. Verify that the attached workstation has a functioning adapter card. Try the card in another workstation that is successfully connecting to the network.**

Diagnosing Hub Indicators

You can easily monitor the hub through LED indicators on the front panel. [Table 4-1](#) describes common problems and possible solutions.

Table 4-1. LED Indicators

Symptom	Cause	Solution
The Link 10/100 Mb/s indicator does not light up after making a connection.	A network interface, such as an adapter card on the attached device, a network cable, or the hub port is defective.	<ul style="list-style-type: none"> • Verify that the hub and attached device are powered on. • Be sure the cable is securely plugged into the hub and the device. • Verify the proper cable length is being used. • Check the adapter or cable connections for defects. Replace defective parts.
The Power indicator does not light up (green) after powering on.	A power outlet, power cord, or internal power supply is defective.	<ul style="list-style-type: none"> • Check the power outlet by plugging in another, properly functioning, device. • Check the power cord by plugging it into another, properly functioning, device. • If you still do not have power, contact Customer Support, as explained in "How to Get Help" on page xvi for assistance.
The hub powers off after running for a time.	Loose connections, or power surges or losses may have occurred.	<ul style="list-style-type: none"> • Check for loose power connections. Verify all connections are seated securely. • Determine if power surges or losses occurred at the power outlet. • Verify that the fan on the back of the hub is unobstructed and running.

Appendix A

Technical Specifications

[Table A-1](#) provides technical information regarding product specifications, port and cable assignments, and EMI certification.

Table A-1. Product Specifications

Item	Description
Standards Conformance	IEEE 802.3 Ethernet, IEEE 802.3u Fast Ethernet
Access Method	CSMA/CD, 10 Mb/s, or 100 Mb/s
Communication Rate	10/100 Mb/s on RJ-45 ports
Media Supported	10 BASE-T - 100 Ohm Category 3, 4, 5 twisted pair 100 BASE-TX - 100 Ohm Category 5 twisted pair
Ports	<ul style="list-style-type: none">• 12/24 10/100 Autosensing RJ-45 Ethernet ports• Port 1 can be set to normal (MDI -X) or uplink (MDI) mode
LED indicators	Port status, port link, port partition, collision, activity, 10/100 Mb/s traffic, and power.
Dimensions	482.6 x 204 x 44 mm (19 x 8 x 1.72 inches)
Weight	2.1 kg (4.6 lb)
Input Power	Full range power input: 100 to 240 V AC 50 to 60 Hz
Power Consumption	2.0 A max. @ 100-240 V AC
Heat Dissipation	92.1 BTU/hr max. @ 100-240 V AC
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	80% maximum humidity, noncondensing

Table A-1. Product Specifications (continued)

Item	Description
Certification Emissions Immunity Safety	CE Mark FCC Class A, VCCI Class A, CISPR Class A, BCIQ, AZ/NZS Class A IEC 1000-4-2/3/4/6 CSA/NRTL, TUV/GS, NOM, UL
Internal Switching Specifications	
Network Bridging Function	Filtering, forwarding, and learning
Switching Method	Store-and-forward
Address Table	8K entries
Queue Buffer	512K bytes
Filtering Rate	Line speed
Forwarding Rate	Line speed

Appendix B

Cable and Connector Information

Port Assignments

RJ-45 Ports

This section describes MDI/MDI-X modes and their associated ports, and provides details regarding RJ-45 port pin assignments.

MDI/MDI-X Ports

You can attach the RJ-45 MDI-X ports on the hub to any device, such as routers, servers, or workstations, that uses a standard network interface.

You can daisy-chain RJ-45 MDI ports on the hub to a port on similar networking devices, such as switches or other hubs.

RJ-45 Pin Assignments

[Figure B-1](#) shows the pin assignments in the RJ-45 connector.

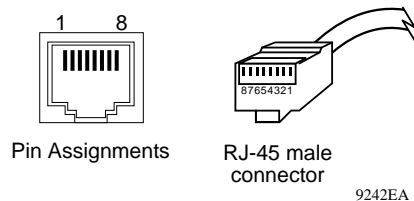


Figure B-1. RJ-45 Pin Assignments

[Table B-1](#) describes the pin assignments.

Table B-1. RJ-45 Pin Descriptions

Pin Number	Assignment (Station Ports 1 through 12 or 24)	Assignment (Daisy-Chain Port, other Devices)
1	Input Receive Data +	Output Transmit Data +
2	Input Receive Data -	Output Transmit Data -
3	Output Transmit Data +	Input Receive Data +
6	Output Transmit Data -	Input Receive Data -
4, 5, 7, 8	Not used	Not used

Cable Assignments

You can use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable to connect to RJ-45 ports.

Use the following cable categories, depending on the type of Ethernet transmissions on your device.

- 10 BASE-T - 100 Ohm Category 3, 4, 5 twisted pair
- 100 BASE-TX - 100 Ohm Category 5 twisted pair

[Figure B-2](#) shows schematics for straight-through and crossover twisted-pair cables.

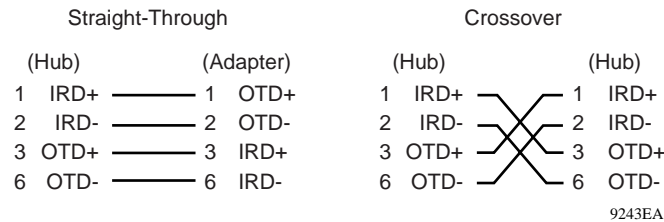


Figure B-2. Cable Schematics

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